

REMARKS

This paper responds to the Office Action mailed on March 15, 2007.

Claim 27 is amended, no claims are canceled, and no claims are added; as a result, claims 27, 33, 36-38 and 44-52 are presently pending in this application.

Claim Objections

Claim 27 was objected to for informalities. Specifically, the Examiner has requested correction of a limitation in claim 27. Applicants have amended claim 27 in accordance with the Examiners instructions, specifically a comma is added between “Si_xN_yO_z:H” and “wherein” at line 11. Withdrawal of the objection is respectfully requested.

§103 Rejection of the Claims

Claims 27, 33, 36-38 and 44-52 were rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,541,164 to Kumar *et al.* (hereinafter, “the Kumar reference”) in view of Applicant’s admitted prior art (hereinafter, “the APA”), or alternatively, as being unpatentable over the Kumar reference in view of the APA and U.S. Patent No. 4,905,073 to Chen *et al.* (hereinafter, “the Chen reference”). Applicants disagree with the stated grounds of rejection and desire to further clarify various distinctions of the present invention over the cited art. Reconsideration of the present application is therefore requested in light of the following remarks.

The Examiner again cites the Kumar reference for disclosing a gate stack that includes, *inter alia*, a gate oxide layer formed on a substrate, a polysilicon layer formed on the gate oxide layer, a tungsten silicide layer formed on the polysilicon layer, and an antireflection layer formed on the tungsten silicide layer (Office Action; page 2). Although the Examiner concedes that the antireflective coating disclosed in the Kumar reference differs from the composition claimed in the present application, the Examiner nevertheless asserts that the allegedly prior art composition (“the APA”) provided in the present application is necessarily compatible with the structure disclosed in the Kumar reference. Applicants disagree.

The composition of the antireflective coating disclosed in the Kumar reference is provided at column 9, lines 1-7. Applicants note that the composition differs markedly from the antireflective coating composition disclosed in the present application. For example, the presently disclosed composition includes a silicon component that varies between 0.39 and 0.65, while Kumar teaches a silicon component that is equal to one. Similarly, the oxygen component taught by the Kumar reference ranges between one and two, while the present application teaches an oxygen component that ranges between 0.05 and 0.33. Applicant therefore respectfully submits that the Kumar reference is not properly combinable with the APA unless the Examiner is adopting the untenable position that all antireflective coatings comprised of silicon, oxygen, nitrogen and hydrogen are interchangeable.

Further, and still with regard to the teachings present in the Kumar reference, Applicants note that the Kumar reference teaches that the antireflective coating may be applied to the disclosed structure without interposing a silicide layer between the polysilicon layer and the antireflection layer. In fact, Applicants note that a *preferred* embodiment of the structure disclosed in Kumar does not include the silicide layer. The Examiner is referred, *inter alia*, to col. 8, lines 27-31, and col. 9, lines 62-65 for this teaching. Applicants therefore submit that, in this important respect, the Kumar reference *teaches away* from the disclosed structures provided in the present application.

The Examiner also concedes that the Kumar reference fails to disclose that the metal silicide layer is an annealed metal silicide layer. Consequently, the Examiner cites the Chen reference for this missing teaching. Chen discloses an annealing step for a silicide layer in an integrated circuit structure. In particular, the Examiner points to the disclosure at column 3, lines 49-51 that describe annealing a silicide that abuts a polysilicon layer (*e.g.*, layers 109 and 118 in Figure 2), and abutting glass, conductive and doped silicon layers (*e.g.*, elements 123, 128, 105 and 103, respectively, also as shown in Figure 2). Applicants cannot find any teaching or suggestion in the Chen reference that the annealing process may be conducted following the application of an antireflection coating to the silicide layer.

Turning now to the claims, differences between the claim language and the cited art will be specifically pointed out. Claim 27 presently recites: “A gate stack, comprising...a layer comprising $\text{Si}_x\text{N}_y\text{O}_z\text{:H}$ formed over and in physical contact with the metal silicide layer, *wherein*

x is from 0.39 to 0.65, y is from 0.02 to 0.56, and z is from 0.05 to 0.33; the annealed metal silicide layer being the product of a process in which the metal silicide layer is subjected to an anneal treatment after the layer comprising $Si_xN_yO_z:H$ is formed...” (Emphasis added). The Kumar reference does not disclose the foregoing formulation, as described more fully above. Although the Applicant’s APA discloses this, there is no suggestion or teaching that the APA may be combined with the structure disclosed in Kumar that yields the embodiments as described in the present application. Applicants again submit that the Examiner impermissibly seeks to assert equivalence between the APA and any antireflection coating. Applicants also submit that Chen provides no disclosure or suggestion that the annealing process described in Chen may be applied to a metal silicide layer following the formation of the layer comprised of $Si_xN_yO_z:H$. Accordingly, claim 27 is allowable over the cited combination. Claims depending from claim 27 are also allowable based upon the allowable form of the base claim and further in view of the additional limitations recited in the dependent claims.

Claim 44, as amended, recites: “A gate stack, comprising...a means for protecting the metal silicide layer during an anneal, *the means for protecting consisting of a $Si_xN_yO_z:H$ layer formed over and in physical contact with the annealed, metal silicide layer...*” (Emphasis added). Again, the Kumar reference simply does not disclose the claimed formulation. The Applicant’s APA fails to disclose or suggest the structure recited in the claim. Claim 44 is therefore also allowable. Claims depending from claim 44 are also allowable based upon the allowable form of the base claim and further in view of the additional limitations recited in the dependent claims.

Finally, claim 50 recites: “A gate stack, comprising...a means for alleviating stress on underlying layers, canceling reflected radiation, and protecting the annealed, titanium silicide layer during an anneal from gaseous oxygen, *the means comprising a $Si_xN_yO_z:H$ layer formed over and in physical contact with the annealed, titanium silicide layer...*”. (Emphasis added). As discussed in greater detail above, the Kumar reference does not disclose the claimed formulation. The Applicant’s APA fails to disclose or suggest the structure recited in the claim. Claim 50 is therefore allowable over the cited art. Claims depending from claim 50 are also allowable based upon the allowable form of the base claim and further in view of the additional limitations recited in the dependent claims.

Reservation of Rights

In the interest of clarity and brevity, Applicant may not have addressed every assertion made in the Office Action. Applicant's silence regarding any such assertion does not constitute any admission or acquiescence. Applicant reserves all rights not exercised in connection with this response, such as the right to challenge or rebut any tacit or explicit characterization of any reference or of any of the present claims, the right to challenge or rebut any asserted factual or legal basis of any of the rejections, the right to swear behind any cited reference such as provided under 37 C.F.R. § 1.131 or otherwise, or the right to assert co-ownership of any cited reference. Applicant does not admit that any of the cited references or any other references of record are relevant to the present claims, or that they constitute prior art. To the extent that any rejection or assertion is based upon the Examiner's personal knowledge, rather than any objective evidence of record as manifested by a cited prior art reference, Applicant timely objects to such reliance on Official Notice, and reserves all rights to request that the Examiner provide a reference or affidavit in support of such assertion, as required by MPEP § 2144.03. Applicant reserves all rights to pursue any cancelled claims in a subsequent patent application claiming the benefit of priority of the present patent application, and to request rejoinder of any withdrawn claim, as required by MPEP § 821.04.

CONCLUSION

Applicant respectfully submits that the claims are in condition for allowance and notification to that effect is earnestly requested. The Examiner is invited to telephone Applicant's attorney (612) 349-9587 to facilitate prosecution of this application.

If necessary, please charge any additional fees or credit overpayment to Deposit Account No. 19-0743.

Respectfully submitted,

ZHIPING YIN ET AL.

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Date

15 May '07

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CERTIFICATE UNDER 37 CFR 1.8: The undersigned hereby certifies that this correspondence is being filed using the USPTO's electronic filing system EFS-Web, and is addressed to: Commissioner of Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on this 15 day of May 2007.

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